

stock. Dr. Stevenson omits the people of the German Empire, but as the vast majority of the Germans are round-headed and of the same average stature and colouring as a very large section of the Russian and French peoples, then they too must be flung into this sad hotch-potch called the Alpine stock. Dr. Stevenson has the hardihood to venture on a picture of the mental characters of the Alpine type.

"Russia is rather the expression of two concepts, the state and the church. The state is autocratic and despotic, because a Russian loves the autocratic principle, and because his type of mind is dogmatic and emotional. Because of a lack of reactive principle such as democracy among the people of England, Russia has from the beginning of her career grown steadily towards absolutism. Further, because Russia, unlike France, has never thrown off autocratic monarchy, an explanation of such a pronounced tendency must be sought deep in the national character."

That quotation is enough to show how hazardous and how vain a thing it is to assess the mental attributes of a race in the manner adopted by Dr. Stevenson. Very likely the Italians and the English will also fail to respond to the picture he has painted of them. Such methods are too crude; they were unscientific, for a method, to have any claim to the recognition of scientific men must bring in definitely verified and measured observations, which generation after generation can add to and expand. There is no possibility of adding to the kind of observation recorded by Dr. Knox or Dr. Stevenson.

Yet there is undoubtedly a real foundation for the doctrine of race. We cannot suppose, when we contrast the behaviour of the various states in South and North America, that the differences to be observed in the Mediterranean and Saxon peoples are all due to tradition and environment; to explain what we find in those continents, we must suppose that the difference in government and behaviour is due to a real difference in the mental outfit of the two stocks. The problem we are faced with is the discovery of precise methods of measuring and recording these differences. We have not discovered such methods as yet, but we may safely presume, in opposition to Dr. Stevenson's main conclusion, that such characters of the brain will be just as subject to the laws of heredity as the shape of the head or stature of the body.

We recognise the importance of the subject to which Dr. Stevenson applies the hybrid term Socio-Anthropometry, but we cannot honestly say he has helped us to a rational understanding of its problems.

A. KEITH.

Adami, J. G., M.D., F.R.S., F.R.C.P. *Medical Contributions to the Study of Evolution.* London: Duckworth and Co.; pp. 361, with seven plates and twenty text-figures; price 17s. 6d.

THIS volume is a most interesting and important contribution to our knowledge of the laws of heredity. It includes a course of lectures delivered by Prof. Adami before the Royal College of Physicians in June, 1917; these constitute about half the book. The remainder is made up of a series of addresses on variability and adaptability delivered by Prof. Adami on various occasions from 1901 onwards, and lastly of another series of addresses collected under the title "Growth and Overgrowth," dealing with the mutual relations of benign and malignant tumours. This patchwork composition of the book is rather irritating to the reader, for one often finds in the second part of the book an earlier stage in the evolution of Prof. Adami's ideas than that which has been already passed through in the first part. But minor defects like these will not bulk largely in one's judgment when one considers the brilliant exposition of new ideas supported by startling arrays of facts which is contained in this work. As a medical writer, Prof. Adami enjoys a great advantage, in that his medical training was based on a

wide knowledge of biology, and especially of zoology; consequently his outlook on medical data is rather different from that of many of his fellow-members of the profession. Instead of regarding these data as the arcana of a craft, he looks on them rightly as particular instances of general biological laws which find their exemplification throughout the entire animal kingdom. The thesis which Prof. Adami supports is briefly this—that acquired characters are inheritable. He begins by pointing out that the *reductio ad absurdum* to which extreme Mendelians have been driven in attempting to account for evolution on the assumption that the sort of mutations which appear in “Mendelising strains” are the only type of variation which occurs in living things. He criticises not too severely the monstrous dogmatism which has imposed itself on so many writers as “Weismann’s proof” that acquired characters are not inheritable. In opposition to this view he brings forward evidence to show that bacteria can acquire new habits, can learn in a word to perfect chemical changes of which they were at first incapable, and that in this way new strains of bacteria can be produced of totally different chemical powers from those of the parent strain. In fact the experiments described by Prof. Adami must, if confirmed, be regarded as quite decisive on this point. There are only two possible ways of evading his Lamarckian conclusions—it may be urged that the reproduction of simple organisms like the bacteria which takes place by simple fission is not comparable to the sexual reproduction of the higher animals, or the theory may be advanced that the production of new races of bacteria is due to the fact that bacteria are constantly varying in all directions and that under new conditions the fittest survive. Prof. Adami points out the ludicrous position one is led into if one assumes that the multiplication of a strain of bacteria is to be compared to the “vegetative” increase of the cells in a higher animal. Few serious biologists indeed will attach any weight to this objection—the more so when it is remembered that Mendelians are quite ready to make use of experiments like those of Jennings on the “fissive” reproduction of unicellular organisms such as *Paramæcium*, if they happen to support their views. The second objection is a more serious one, but it is refuted by a close examination of the conditions under which the production of new races actually takes place. *All* the bacteria situated at a certain level in the liquid which has been slightly altered by the addition of substances so as to constitute a new environment, acquire the new powers and give rise to the new race. We have already pointed out in the pages of this journal that there is evidence that habits and structures acquired by animals as high in the scale as amphibia can be inherited; but we called attention at the same time to the extreme difficulty of experiments designed to prove this, and the great stretches of time which they consumed. The real differences between bacteria and the higher animals are the extraordinary rapidity with which the generations of bacteria succeed one another, and the ease with which their environment can be controlled; these circumstances enable experiments to be carried through in a few weeks in test-tubes, which in the higher animals would require years and elaborate and expensive apparatus. We have devoted much attention to the evidence adduced by Prof. Adami that acquired habits are inherited, as this is the portion of the book of superlative importance to eugenists; but there are many other points in the book of great interest to biologists and physiologists. Thus Prof. Adami points out that no hard line can be drawn between benignant and malignant tumours; that every gradation exists between ovarian cysts, which are obviously imperfect attempts at the production of embryos and simple fibrous tumours; that in fact the activity of every cell of the body is manifested in two phases—the functional and the reproductive; and that if a cell is so placed that its characteristic func-

tion (nervous, muscular or glandular) cannot be carried out, it may remain inactive or its reproductive phase being stimulated, it may give rise to a tumour. It follows that the true line of pathological research in connection with cancer is not the search for an imaginary cancer parasite, but the study of the conditions which stimulate the reproductive activities of the cells. There are many other fascinating suggestions to which limits of space forbid us to refer, but we can only say that we regard Prof. Adami's work as the most brilliant and stimulating series of essays on biology which we have met with for a long time.

E. W. MACBRIDE.

Babcock, E. B. and Clausen, R. E. *Genetics in relation to Agriculture*. McCraw-Hill Book Company, New York and London; 1918; f.p. 675; price 18s.

A BOOK of this sort fulfils a need. The important part that the science of genetics is destined to play in the development of Agriculture has been clearly recognised in the United States for some time past. Many of the States already support large and well-endowed institutions for carrying on experimental work, and in some of these, notably Connecticut and Maine, results of great value have already been obtained. Fresh centres, too, are continually being developed in other parts of N. America. Their success must depend upon the supply of well-trained investigators. This also is clearly perceived, and the reader of the present volume has only to turn to the photographs of the genetic laboratories of Illinois and California, on pp. 609-610, to realise that the United States are not sparing expenditure in developing facilities for training in this new science. It is to meet the requirements of a rapidly increasing number of students that the authors have collaborated in producing the present volume. Their aim has been to present the practical applications of genetics as well as the scientific foundations upon which these must be based, and with this end in view, the book has been divided into three sections dealing respectively with Fundamentals, Plant Breeding and Animal Breeding. To-day the first section makes the greatest claim upon space, though doubtless later this position will be reversed.

The book meets a definite need, and as years go on will probably appear from time to time in new and enlarged editions. For this reason, as the authors recognise in their preface, it deserves all the criticism it can get. Such criticism is here offered, not with the idea of emphasising the shortcomings inevitable in what must of necessity be a laborious compilation, but to help the authors in the preparation of future editions of a work which is likely to be a mainstay of the student for many years to come.

As the book is in great measure designed for the undergraduate student, we think that he should be introduced at the outset to the fundamental facts of heredity. Mendel's discovery has so deeply influenced our outlook on the problem of variation, that this may well be left for discussion until essentials have been mastered. For this reason, too, we think it a mistake to devote a long chapter to the statistical study of variation so early in the book. It is hardly relevant to the main purpose and would be more in its place if presented as an appendix.

Another rearrangement which we should like to see is the transference of the chapter dealing with Chimæras from the second to the first section of the book. These phenomena are not at present of much direct practical importance, though their scientific interest is very great. And in this connection mention ought to be made of Bateson's interesting case of the behaviour of root-cuttings in *Bouvardia*.

The chapter on mutations strikes us as one of the weakest in the book, perhaps for the reason that the authors have tied themselves down so closely to what is generally termed the chromosome theory of heredity.